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Gu et al.

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(54) **PROCESS CARTRIDGE HAVING A DRIVING FORCE RECEIVER**

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(73) Assignee: **ZHUHAI SEINE TECHNOLOGY CO., LTD.**, Guangdong (CN)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/642,877**

(22) Filed: **Mar. 10, 2015**

(65) **Prior Publication Data**

US 2015/0177683 A1 Jun. 25, 2015

Related U.S. Application Data

(63) Continuation-in-part of application No. 13/548,981, filed on Jul. 13, 2012, now Pat. No. 9,176,467, which is a continuation-in-part of application No. PCT/CN2010/079377, filed on Dec. 2, 2010.

(30) **Foreign Application Priority Data**

Jan. 28, 2010 (CN) 2010 1 0104692
Mar. 22, 2010 (CN) 2010 1 0131386

(51) **Int. Cl.**
G03G 21/00 (2006.01)
G03G 21/18 (2006.01)

(52) **U.S. Cl.**
CPC ***G03G 21/1857*** (2013.01); ***G03G 21/186*** (2013.01)

(58) **Field of Classification Search**
CPC G03G 21/1857; G03G 21/186
USPC 399/111
See application file for complete search history.

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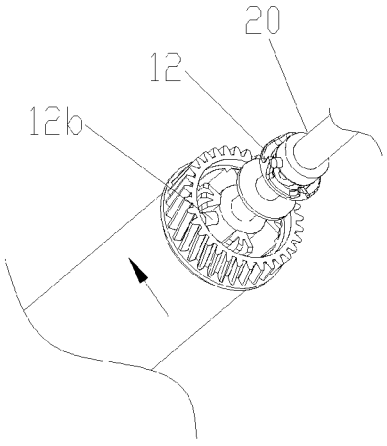
Primary Examiner — Quana M Grainger
(74) *Attorney, Agent, or Firm* — Troutman Sanders LLP

(57) **ABSTRACT**

The invention relates to a process cartridge, which comprises a process cartridge housing, a photosensitive member, a driving force receiving opening, a retractable mechanism and a control mechanism, wherein the photosensitive member is arranged inside the process cartridge housing; the driving force receiving opening is connected with the photosensitive member and provides a driving force for the photosensitive member; the retractable mechanism allows the driving force receiving opening to extend or retract in the axial direction of the photosensitive member; and the control mechanism controls the extension and retraction of the retractable mechanism.

23 Claims, 17 Drawing Sheets



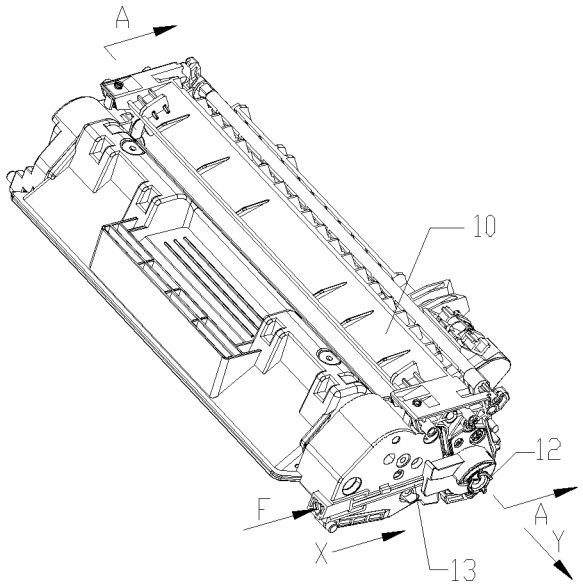


FIG. 1

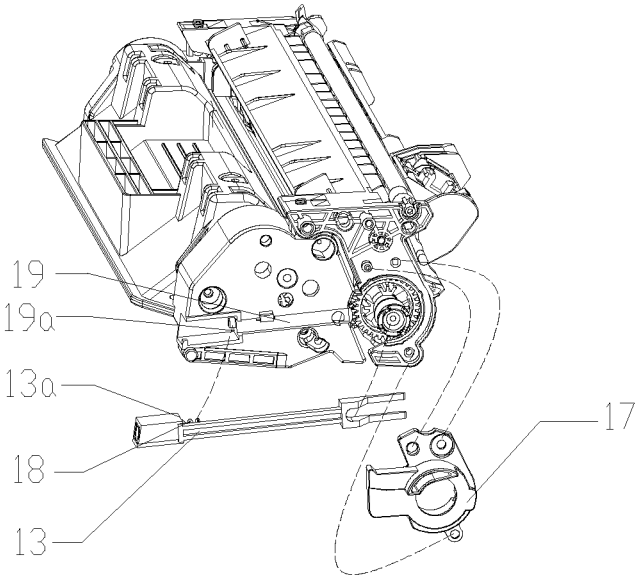


FIG. 2

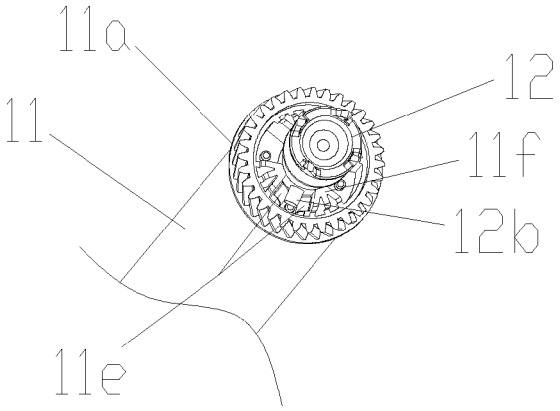


FIG. 3

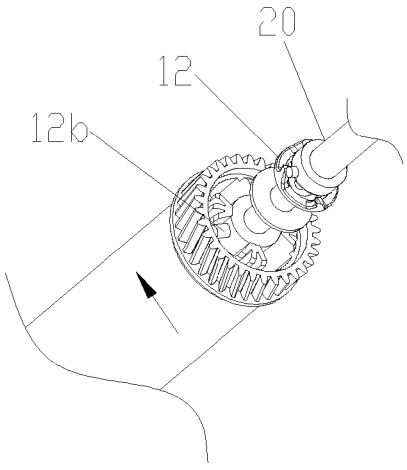
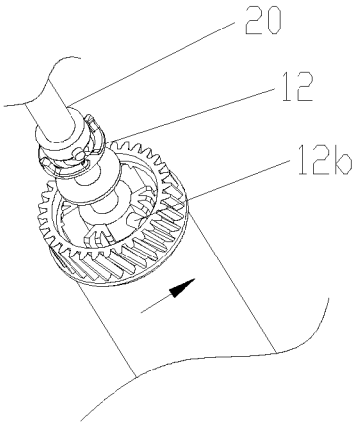


FIG. 4



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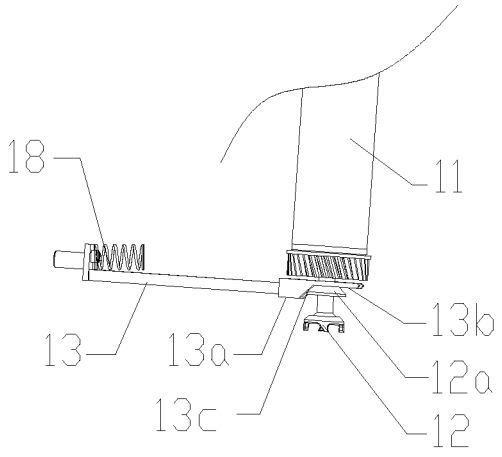

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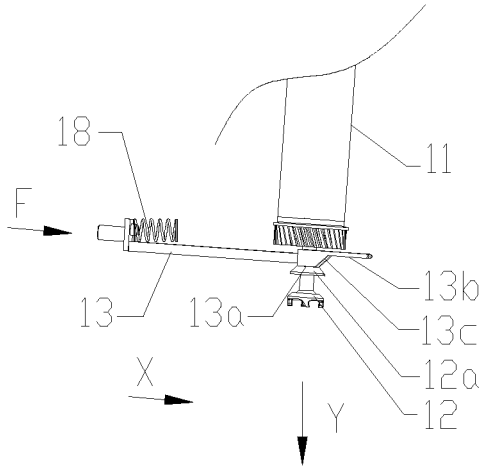

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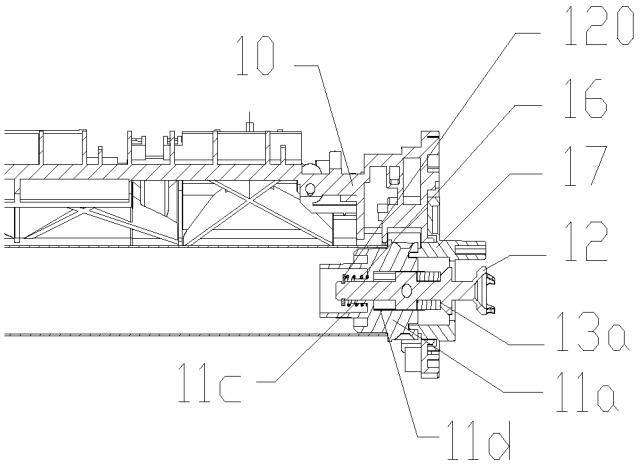

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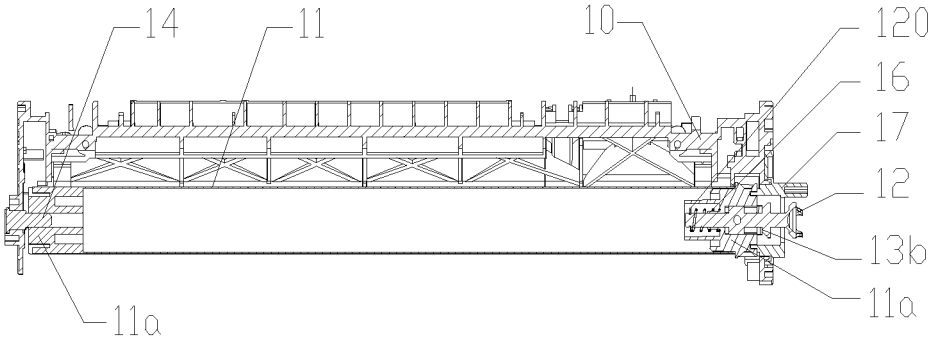

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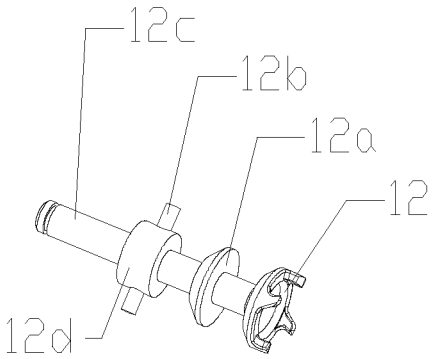

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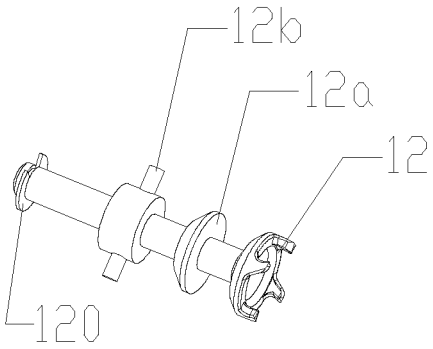


FIG. 11

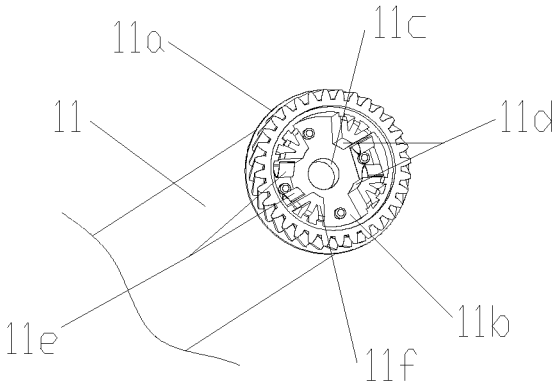
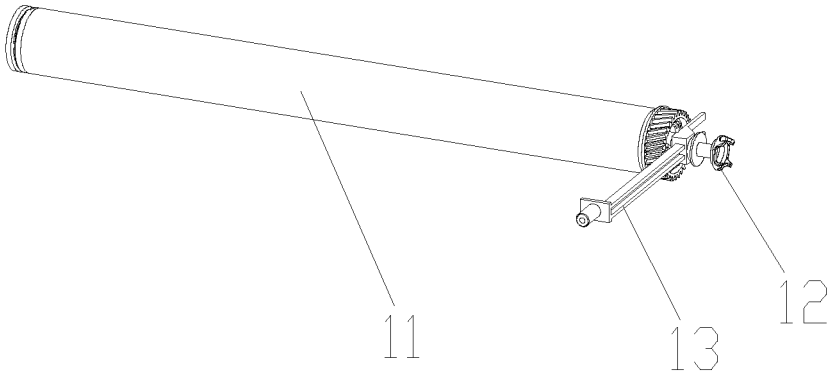


FIG. 12



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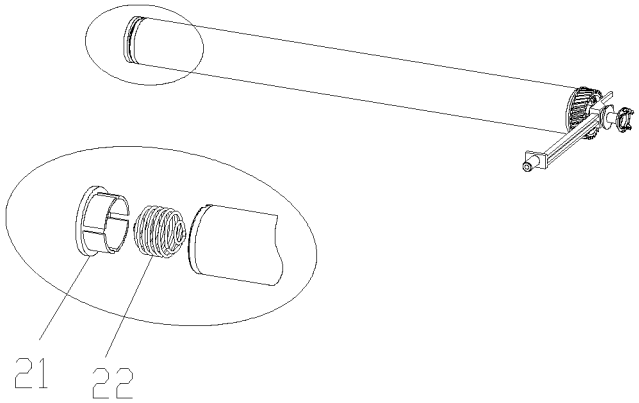

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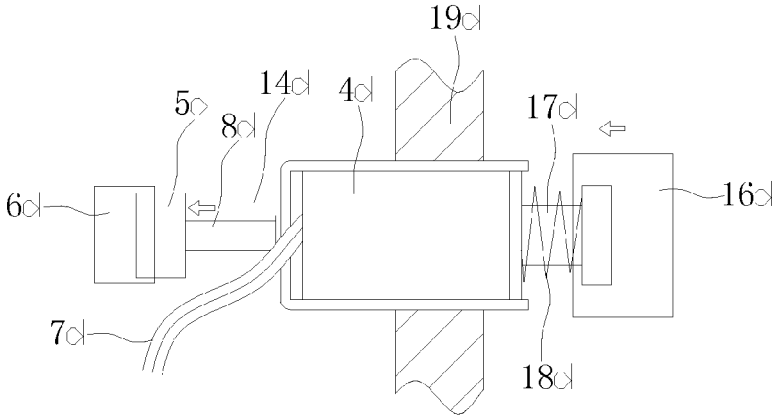

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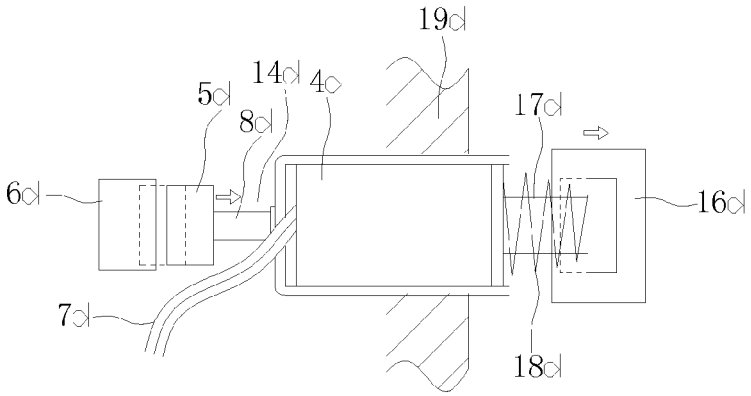

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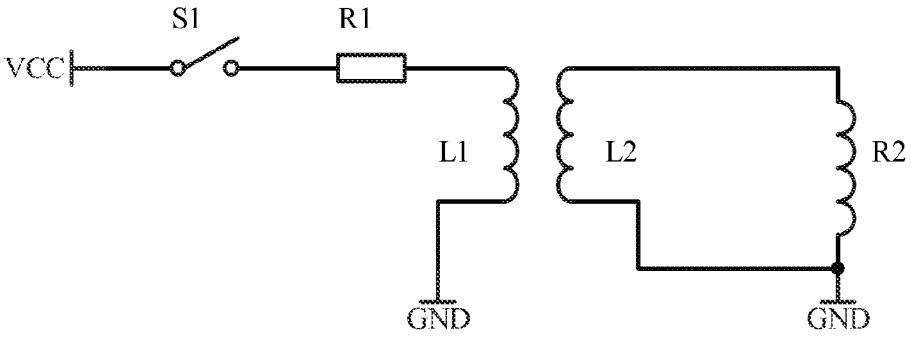

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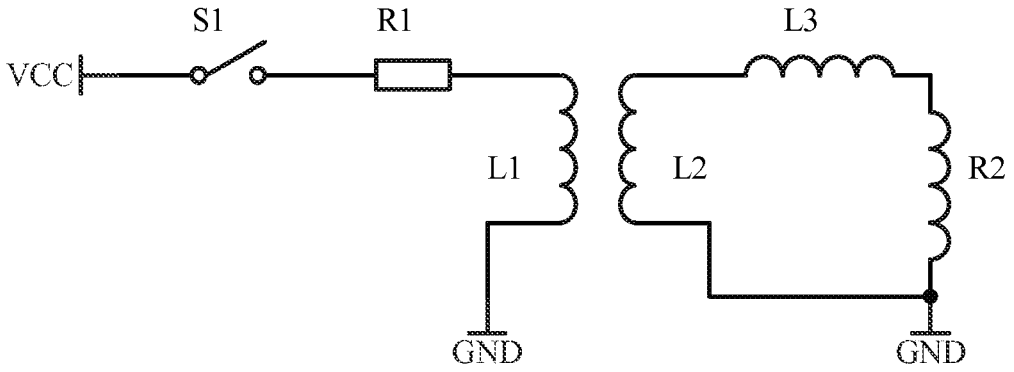

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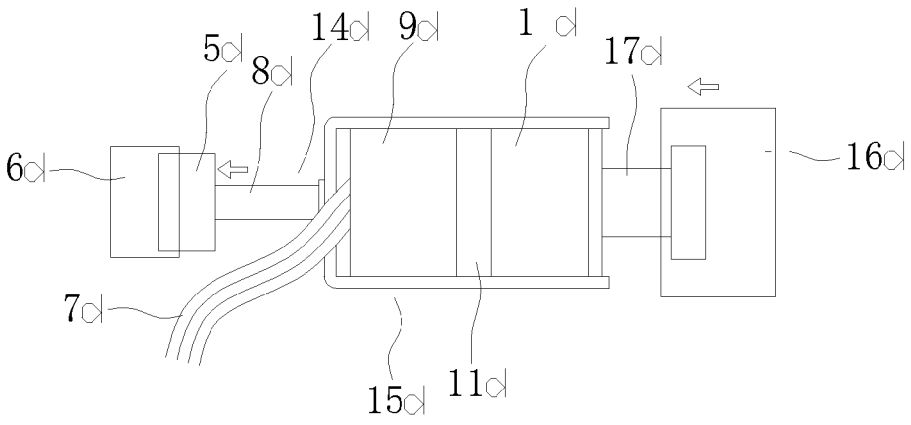

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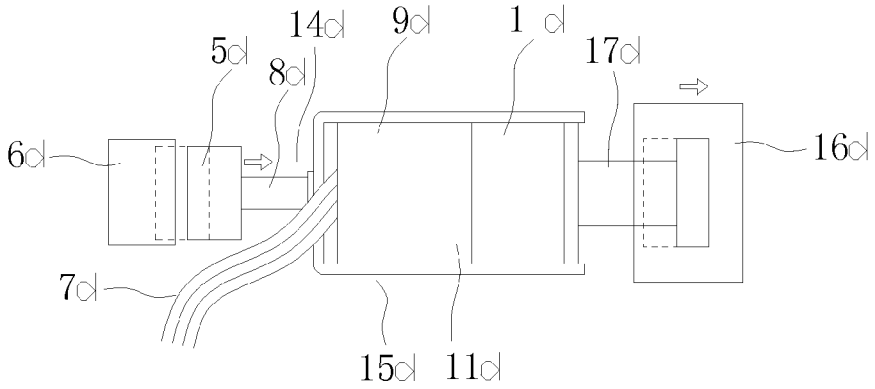

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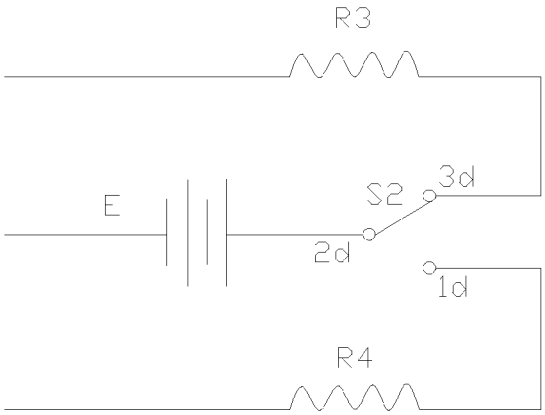

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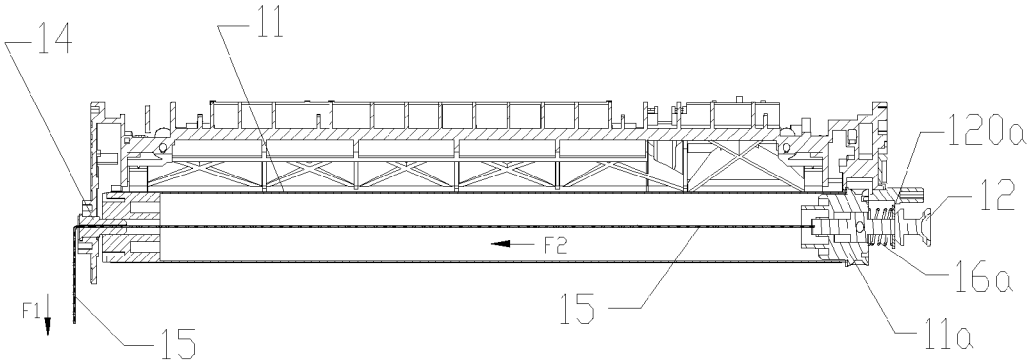

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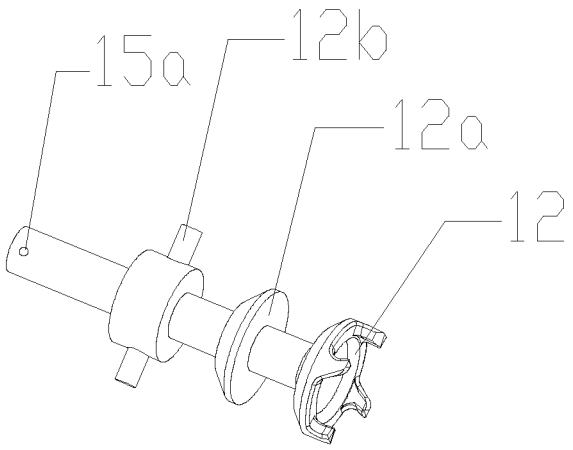

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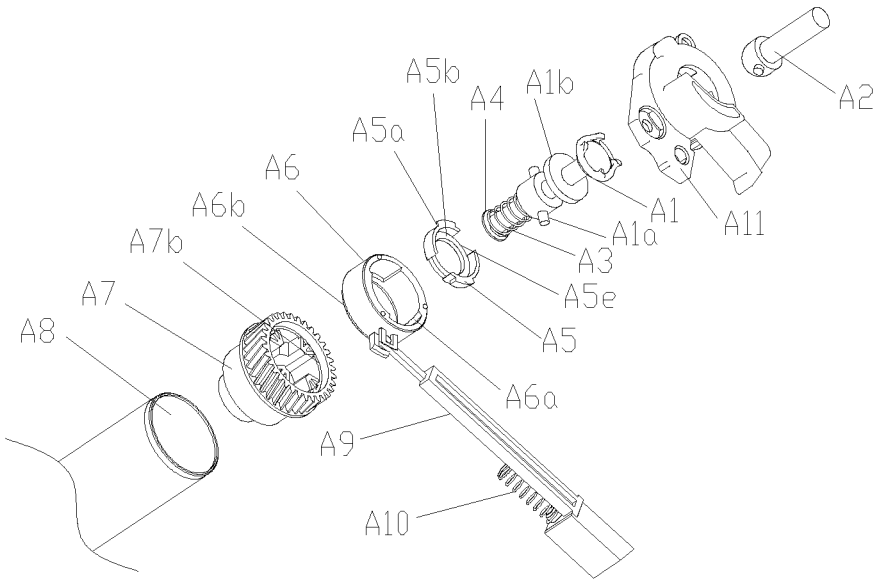

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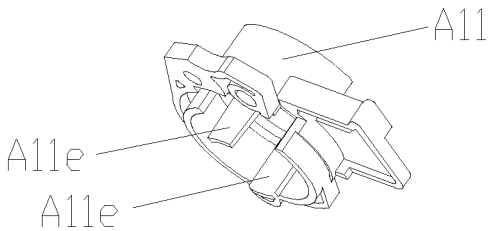

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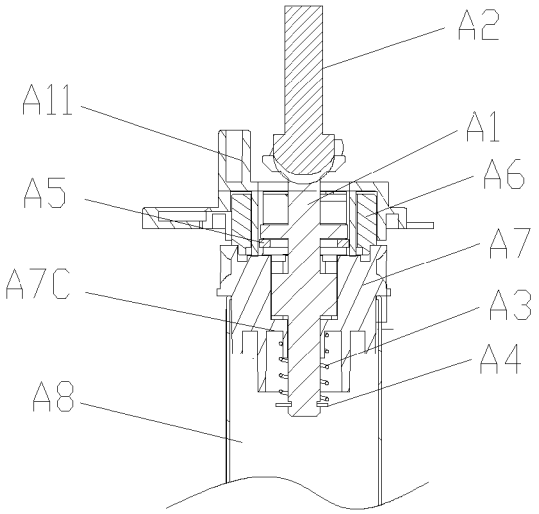

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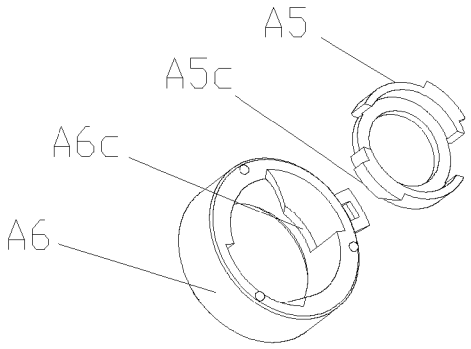

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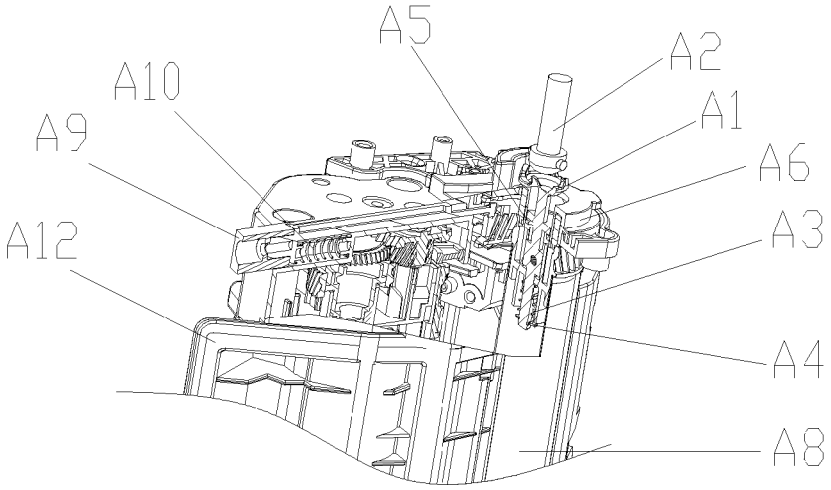

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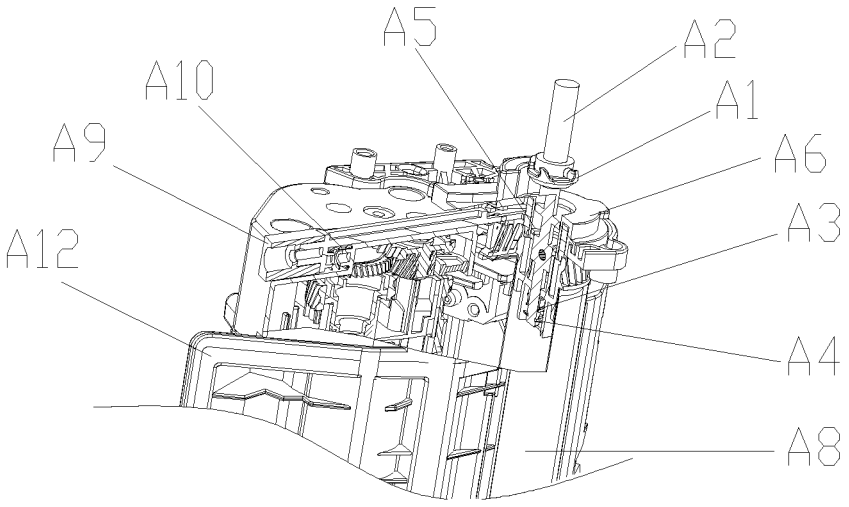

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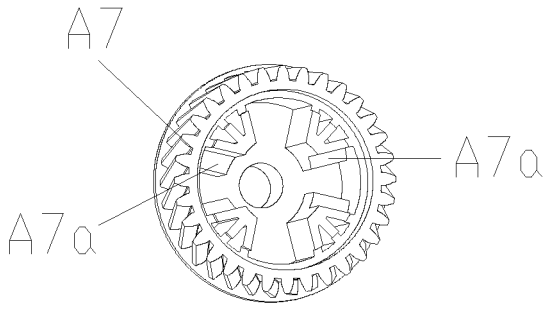
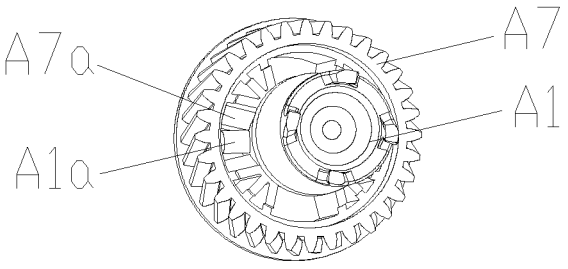


FIG. 30



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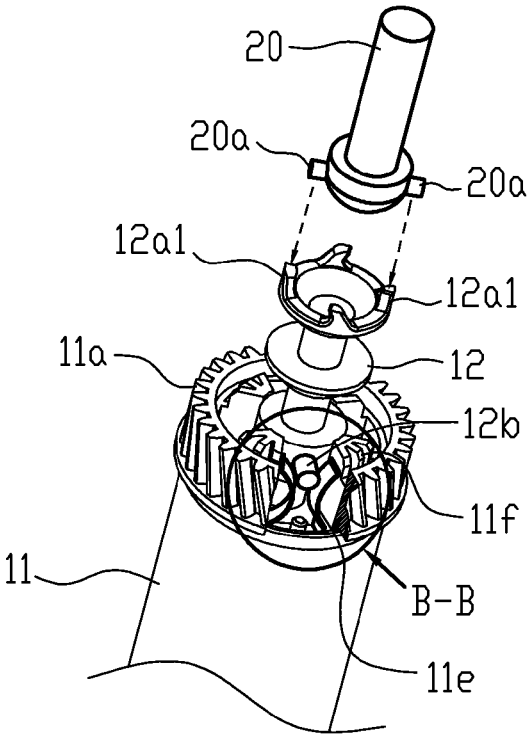
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12b
11f
11
B-B
11e

FIG. 32

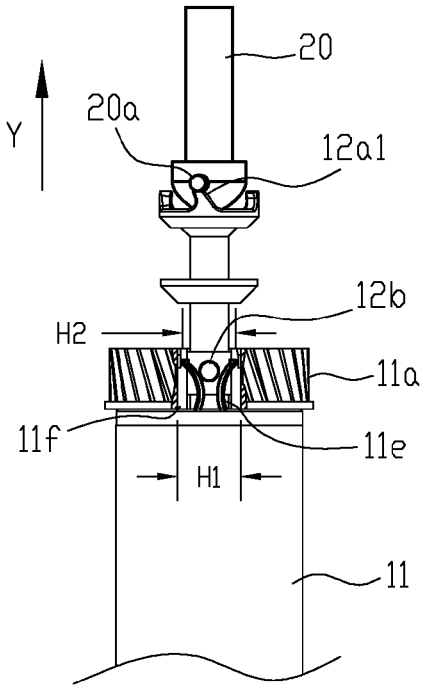
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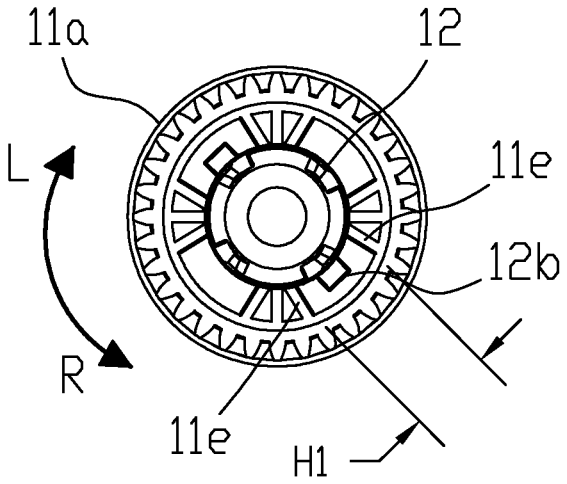
FIG. 33



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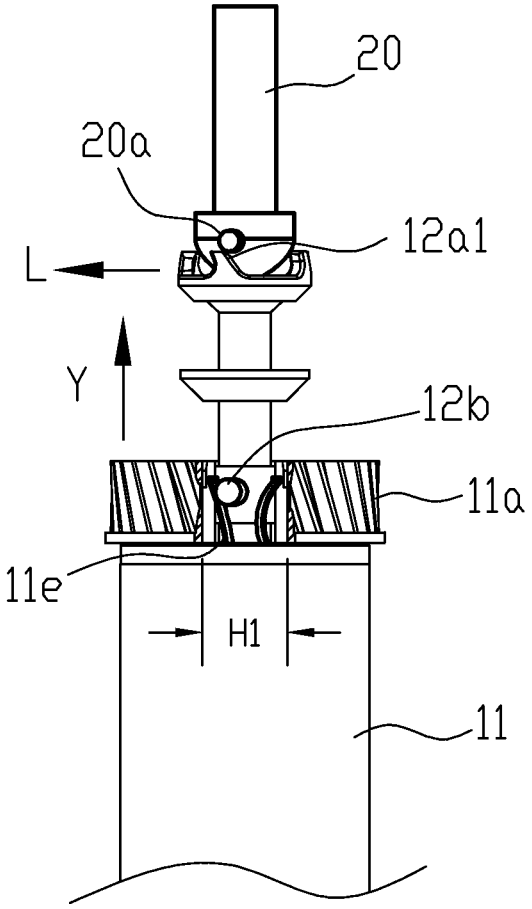

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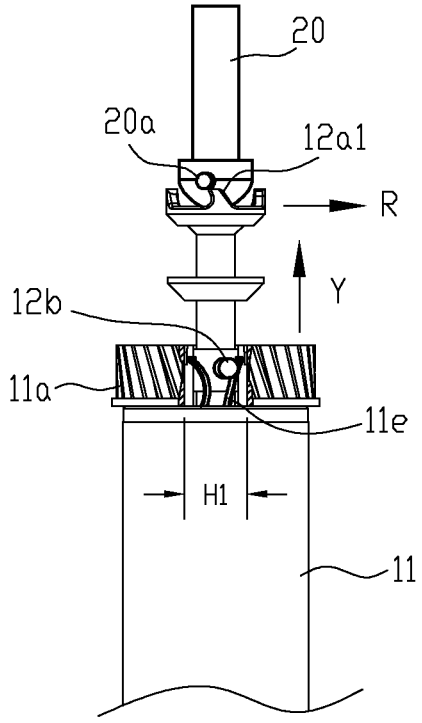
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H1
11

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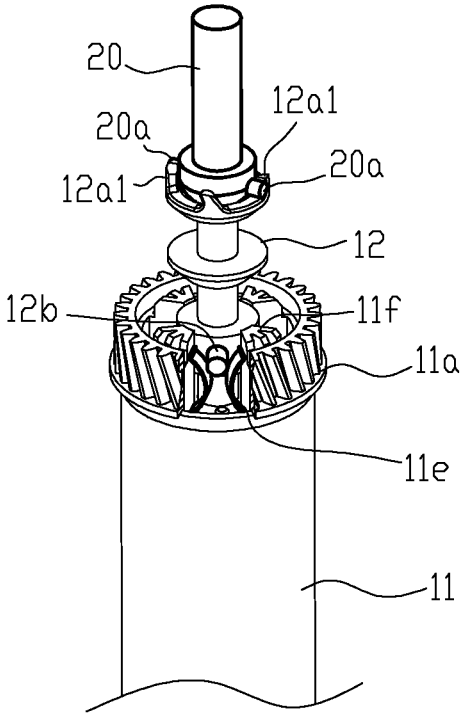
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FIG. 37

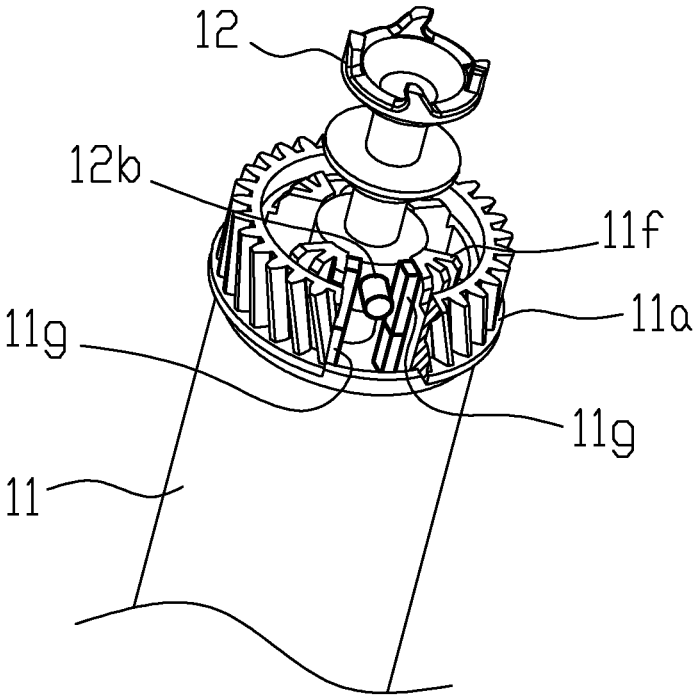

FIG. 38

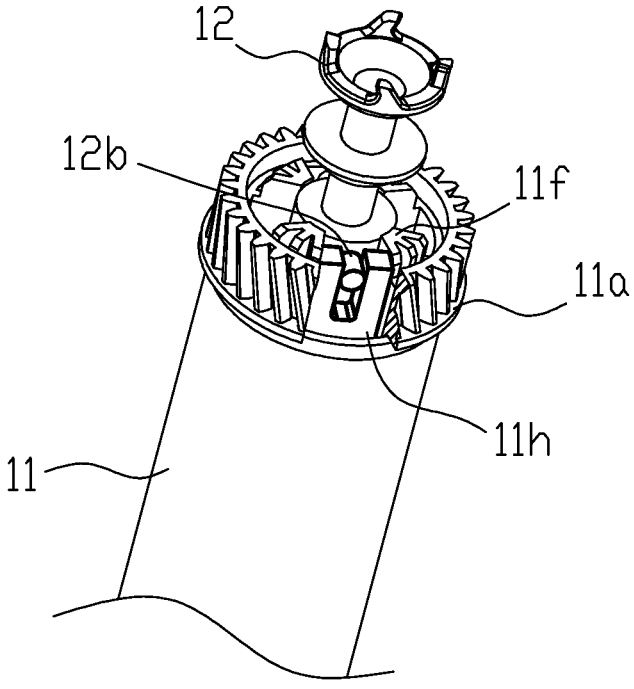

FIG. 39

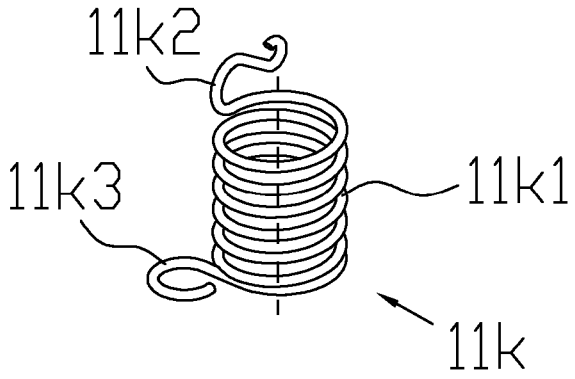

FIG. 40

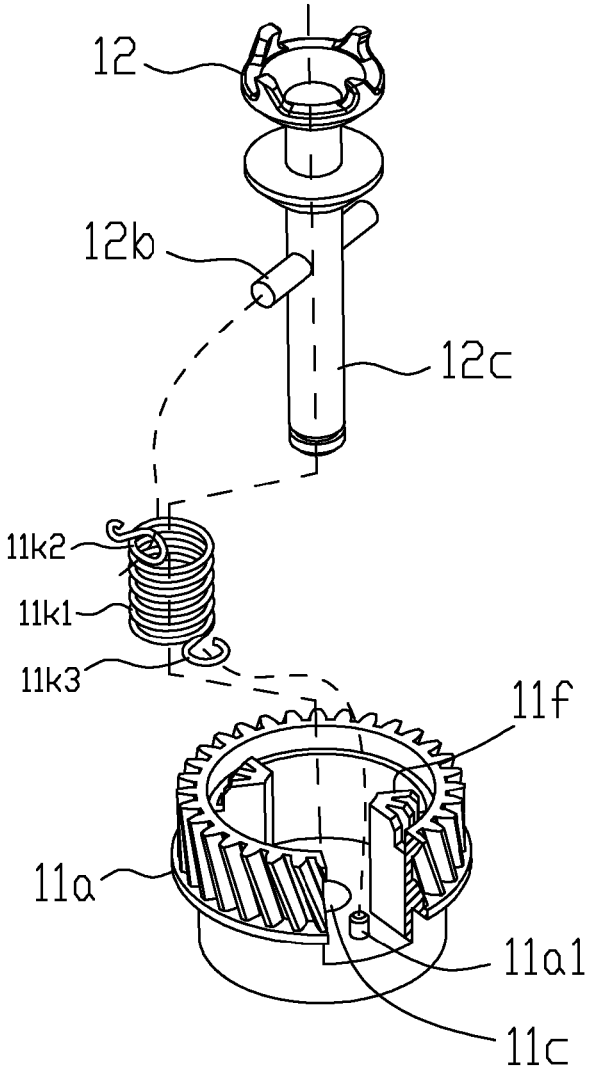

FIG. 41

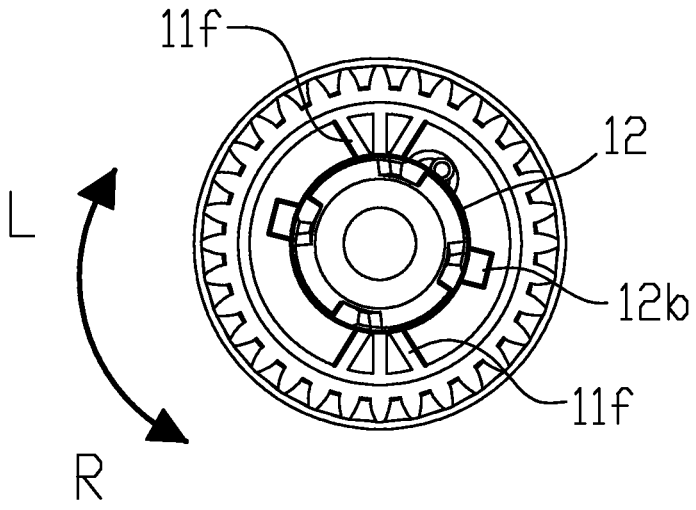

FIG. 42

PROCESS CARTRIDGE HAVING A DRIVING FORCE RECEIVER

CROSS-REFERENCE TO RELATED APPLICATIONS

This is a continuation-in-part application of U.S. application Ser. No. 13/548,981, filed on Jul. 13, 2012, which is a continuation-in-part application of International Application PCT/CN2010/079377, with an international filing date of Dec. 2, 2010, and claims priority to Chinese Patent Application No. 201010104692.6, Jan. 28, 2010, and Chinese Patent Application No. 201010131386.1, filed Mar. 22, 2010. The contents of all the above applications are incorporated by reference herein as if each was restated in full.

FIELD OF THE INVENTION

The invention relates to an image forming device based on electrostatic printing technology, in particular to a process cartridge applied to the same.

BACKGROUND OF THE INVENTION

The invention relates to a process cartridge which is detachably arranged on an image forming device based on electrostatic printing technology, wherein the image forming device can be any one of a laser image forming device, an LED image forming device, a copier or a facsimile apparatus.

The working process of the image forming device based on the electrostatic printing technology is as follows: firstly, predetermined charges are uniformly charged on the surface of a photosensitive member by a charging component; secondly, an electrostatic latent image is formed on the surface of the photosensitive member, with the predetermined charges, is subjected to exposure treatment; thirdly, a developer is conveyed to the photosensitive member by developing components, so that the electrostatic latent image on the surface of the photosensitive member can be developed; fourthly, the developer on the electrostatic latent image is transferred to an image recording medium such as paper after transfering; and finally, the developer, which is not completely transferred, on the surface of the photosensitive member, is cleaned by a cleaning component, so that the photosensitive member is allowed to go into the next charging, and the next cycle.

A process cartridge is used in the image forming device. As a cartridge unit, the process cartridge is integrated with one or more than one of the following components: a photosensitive member such as an organic photosensitive drum and a series of components acting on the photosensitive member, such as the charging component, the cleaning component and the developing components.

A process cartridge in the prior art comprises two main frames, wherein a charging roller, a wiper blade and a photosensitive member are arranged on a first main frame; a developer, a magnetic roller and an adjusting blade used for adjusting the thickness of the developer on the magnetic roller are reserved on a second main frame; the charging roller is taken as a charging component; the wiper blade is taken as a cleaning component; the magnetic roller, the adjusting blade, etc. are taken as developing components; and the first main frame and the second main frame which are provided with the above components are assembled to form the process cartridge as a whole. The process cartridge is assembled or disassembled on an image forming device by a terminal user, wherein a professional maintainer is not required, thus the maintenance is convenient for terminal users.

In general, a driving force receiving opening is arranged on the photosensitive member and engaged with a driving mechanism in the image forming device to drive the photosensitive member to perform rotational movement. However, as the photosensitive member is required to be detachably arranged on the image forming device along with the process cartridge, the driving force receiving opening and the driving mechanism are required to be disengaged when the process cartridge is disassembled from the image forming device, so that the process cartridge can be successfully disassembled from the image forming device; and the driving force receiving opening and the driving mechanism are required to be engaged when the process cartridge is assembled into the image forming device for printing, so that the photosensitive member can be rotated successfully.

The Chinese patent application CN200920129260.3 discloses a process cartridge with a flexible pressure device. The flexible pressure device is arranged on a photosensitive drum and allows a driving force receiver to stably receive a driving force, so that the driving force receiver has free gap in the rotational axial direction of the photosensitive drum. Therefore, not only the driving force receiver has certain free gap in the rotational axial direction of the photosensitive drum and leans against a driving end of an image forming device to realize the assembly of a toner cartridge in the axial direction of the photosensitive drum but also the coaxial transmission between the driving force receiver and the photosensitive drum is more reliable and the structure is simpler. Moreover, as the driving force receiver is detachably arranged at one end of the photosensitive drum, the photosensitive drum is convenient in maintenance. As different driving force receivers are used for different image forming devices but the main body, namely the photosensitive drum, is the same, users only need to replace the driving force receiver but not need to replace the photosensitive drum, thus the manufacturing cost and the use cost are reduced. However, due to the flexible pressure device, the driving force receiver, namely the driving force receiving opening, is always in the pressurized state when beginning to get engaged and disengaged with a driving mechanism of the image forming device, thus the driving force receiver and the driving member for the image forming device cannot be kept in a straight line when beginning to get engaged and disengaged as the inner space of the image forming device is limited, consequently the driving force receiver and the driving member of the image forming device are inevitably subjected to the friction damage when meeting a bevel when beginning to get engaged and disengaged and then the engagement between the driving force receiver and the driving member of the image forming device is affected.

SUMMARY OF THE INVENTION

The invention provides a process cartridge to solve the technical problem that a driving force receiving opening for the traditional process cartridge and a driving mechanism for an image forming device can be subjected to the friction damage when meeting a bevel when beginning to get engaged and disengaged and then the engagement between the driving force receiving opening for the traditional process cartridge and the driving mechanism for the image forming device is affected.

In order to solve the technical problem, the invention adopts the technical proposal that:

The invention relates to a process cartridge, which comprises a process cartridge housing, a photosensitive member, a driving force receiving opening, a retractable mechanism and a control mechanism, wherein the photosensitive member is arranged inside the process cartridge housing; the driving force receiving opening is connected with the photosensitive member and provides a driving force for the photosensitive member; the retractable mechanism allows the driving force receiving opening to extend or retract in the axial direction of the photosensitive member; and the control mechanism controls the extension and retraction of the retractable mechanism;

The control mechanism comprises a first elastic component and a press rod which is arranged at one side of the process cartridge housing, at which the driving force receiving opening is arranged; the press rod is connected with the retractable mechanism; and one end of the first elastic component is connected with the press rod while the other end of the first elastic component is connected with the process cartridge housing.

An opening is provided at one end of the press rod; an urging surface and a retracted surface are arranged at the end of the press rod, at which the opening is provided; the urging surface and the retracted surface have height difference in the axial direction of the photosensitive member; and a support base is arranged on the driving force receiving opening and can be supported by the urging surface or the retracted surface.

The control mechanism comprises a solenoid valve, a power source for supplying electrical energy to the solenoid valve, and a circuit for converting the power source into the electrical energy required by the solenoid valve; the solenoid valve is fixed on the process cartridge housing; the retractable mechanism comprises an A core and a shaft which interact with the solenoid valve; the A core and the shaft are integrated into a whole; the driving force receiving opening is arranged at one end of the shaft; and one end of the A core is connected with the photosensitive member and transmits driving force for the photosensitive member.

The solenoid valve is a single-coil solenoid valve.

The control mechanism comprises a guy of which one end is connected with the retractable mechanism and the other end receives a tensile force, and the guy is arranged on the process cartridge housing.

The control mechanism comprises a double-coil solenoid valve, a power source for supplying electrical energy to the solenoid valve, and a circuit for converting the power source into the electrical energy required by the solenoid valve; a first coil, a second coil and a magnet are arranged on the solenoid valve which is fixed on the process cartridge housing; the retractable mechanism also comprises an A core and a shaft which interact with the solenoid valve; the A core and the shaft are integrated into a whole; the driving force receiving opening is arranged at one end of the shaft; and one end of the A core is connected with the photosensitive member and transmits driving force for the photosensitive member.

The photosensitive member and the process cartridge housing do not slide relative to each other; and one end of the retractable mechanism is connected with the photosensitive member while the other end of the retractable mechanism is connected with the driving force receiving opening.

The photosensitive member is fixedly connected with the driving force receiving opening; and one end of the retractable mechanism is connected with the process cartridge housing while the other end of the retractable mechanism is connected with the photosensitive member or the driving force receiving opening.

The retractable mechanism comprises guide grooves which are arranged on the photosensitive member and guide posts which are arranged on the driving force receiving opening; and the guide posts can slide along the guide grooves.

The retractable mechanism also comprises a transmission part; the photosensitive member is also provided with stressed columns; and the driving force transmission between the driving force receiving opening and the photosensitive member is performed through the engagement of the transmission part and the stressed columns.

A plurality of the stress columns are arranged; and said transmission part is arranged between steel plates between said stressed columns.

The photosensitive member or the driving force receiving opening is supported on the process cartridge housing and can slide along the process cartridge housing.

The process cartridge housing is also provided with a shaft pin and a support; both ends of the photosensitive member are respectively supported by the shaft pin and the support on the process cartridge housing; and the photosensitive member can slide relative to the shaft pin and the support.

The retractable mechanism comprises a second elastic component which is arranged between the driving force receiving opening and the photosensitive member.

The retractable mechanism comprises a second elastic component which is arranged between the driving force receiving opening and the process cartridge housing.

The second elastic component is a tension spring.

By adoption of the technical proposal, due to the addition of the control mechanism for controlling the extension and retraction of the retractable mechanism, the extension and retraction of the driving force receiving opening can be controlled just by controlling the extension and retraction of the retractable mechanism through the control mechanism when the driving force receiving opening and a driving mechanism for an image forming device begin to get engaged and disengaged, thus the driving force receiving opening and the driving mechanism for the image forming device can be kept in a straight line when beginning to get engaged and disengaged, consequently the engagement between the driving force receiving opening and the driving mechanism for the image forming device cannot be affected by the friction damage when meeting a bevel. Therefore, the technical problem, that the engagement between the driving force receiving opening for the traditional process cartridge and the driving mechanism for the image forming device is affected by the friction damage when meeting the bevel when beginning to get engaged and disengaged, is solved. Moreover, the control mechanism has two modes, namely mechanical control and solenoid-valve control, so that users not only can select the safe and reliable mechanical control mode as required but also can select the solenoid-valve control mode according to the requirement of automatic control. Meanwhile, the invention also provides a plurality of reliable retractable mechanisms, so that the reliability of the retractable mechanisms is greatly improved.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a stereogram of a process cartridge of the first embodiment of the invention;

FIG. **2** is an exploded view of the process cartridge illustrated in FIG. **1**;

FIG. **3** is a stereogram illustrating a connecting structure of a photosensitive member and a driving force receiving opening for the process cartridge in the first embodiment of the invention;

FIG. **4** is a stereogram of a first possible limiting position during the engagement of the driving force receiving opening for the process cartridge and a driving head for an image forming device when no steel plates are arranged between stressed columns in the first embodiment of the invention;

FIG. **5** is a stereogram of a second possible limiting position during the engagement of the driving force receiving opening for the process cartridge and the driving head for the image forming device when no steel plates are arranged between the stressed columns in the first embodiment of the invention;

FIGS. **6** and **7** are schematic diagrams illustrating the interaction between the driving force receiving opening and a press rod for the process cartridge, wherein FIG. **6** illustrates the retracted state of the driving force receiving opening and FIG. **7** illustrates the extended state of the driving force receiving opening;

FIG. **8** is a section view of an A-A cross section of the process cartridge illustrated in FIG. **1** when the press rod is pressed and the driving force receiving opening is in the extended state;

FIG. **9** is a section view of the A-A cross section of the process cartridge illustrated in FIG. **1** when the press rod is not pressed and the driving force receiving opening is in the retracted state;

FIG. **10** is a stereogram of the driving force receiving opening for the process cartridge illustrated in FIG. **1**;

FIG. **11** is a stereogram of the driving force receiving opening for the process cartridge illustrated in FIG. **1** after a press fastener is arranged on the driving force receiving opening;

FIG. **12** is a stereogram of the photosensitive member for the process cartridge illustrated in FIG. **1** when the driving force receiving opening is not arranged on the photosensitive member;

FIG. **13** is a schematic diagram illustrating the state when a press rod make the photosensitive member and the driving force receiving opening to extend or retract in a second embodiment of the invention;

FIG. **14** is a partial enlarged view of an end of the photosensitive member in the second embodiment of the invention where the tension spring is disposed;

FIG. **15** is a schematic diagram illustrating the sate when a driving force receiving opening and a driving mechanism are connected with each other when a third embodiment of the invention is in the power-on state;

FIG. **16** is a schematic diagram illustrating the state when the driving force receiving opening and the driving mechanism do not contact each other when the third embodiment of the invention is in the power-off state;

FIG. **17** is a schematic diagram of an operating circuit of the third embodiment of the invention;

FIG. **18** is a schematic diagram of another operating circuit of the third embodiment of the invention;

FIG. **19** is a schematic diagram illustrating the sate when a driving force receiving opening and a driving mechanism are connected with each other when a fourth embodiment of the invention is in the power-on state;

FIG. **20** is a schematic diagram illustrating the state when the driving force receiving opening and the driving mechanism do not contact each other when the fourth embodiment of the invention is in the power-off state;

FIG. **21** is a schematic diagram of an operating circuit of the fourth embodiment of the invention;

FIG. **22** is a section view of a fifth embodiment of the invention;

FIG. **23** is a stereogram of a driving force receiving opening of the fifth embodiment of the invention;

FIG. **24** is an exploded view of a driving force transmission mechanism for a photosensitive member in a sixth embodiment of the invention;

FIG. **25** is a stereogram of an end cover of the driving force transmission mechanism for the photosensitive member in the sixth embodiment of the invention;

FIG. **26** is a section view of the driving force transmission mechanism for the photosensitive member in the sixth embodiment of the invention;

FIG. **27** is an exploded view of a centering ring and a guide sleeve in the driving force transmission mechanism for the photosensitive member in the sixth embodiment of the invention;

FIG. **28** is a partial section view of a toner cartridge before the driving force receiving opening of the driving force transmission mechanism for the photosensitive member in the sixth embodiment of the invention is engaged with a driving head for an image forming device;

FIG. **29** is a partial section view of a toner cartridge after the driving force receiving opening of the driving force transmission mechanism for the photosensitive member in the sixth embodiment of the invention is engaged with the driving head for the image forming device;

FIG. **30** is a stereogram of a photosensitive member flange of the driving force transmission mechanism for the photosensitive member in the sixth embodiment of the invention; and

FIG. **31** is a stereogram illustrating the state when the driving force receiving opening of the driving force transmission mechanism for the photosensitive member in the sixth embodiment of the invention is arranged inside the photosensitive member flange.

FIG. **32** is a structure schematic diagram of the steel plate disposed in the flange in the first embodiment of the invention.

FIG. **33** is a schematic diagram illustrating the structural interference produced between the driving force receiving opening and the driving mechanism when the driving force receiving opening is extended, in the first embodiment of the invention.

FIG. **34** is a schematic diagram illustrating the action that the driving force receiving opening can partially rotate, in the first embodiment of the invention.

FIG. **35** is a schematic diagram illustrating the elastic deformation of the steel plate in the case of structural interference between the projections and the transmission columns, in the first embodiment of the invention.

FIG. **36** is a schematic diagram illustrating the elastic deformation of the steel plate in the case of structural interference between the projections and the transmission columns, in the first embodiment of the invention.

FIG. **37** is a schematic diagram illustrating the contact engagement between the driving force receiving opening and the driving mechanism, in the first embodiment of the invention.

FIG. **38** is a structure schematic diagram of a magnetic member disposed in the flange in the first embodiment of the invention.

FIG. **39** is a structure schematic diagram of an elastic member disposed in the flange in the first embodiment of the invention.

FIG. **40** is a structure schematic diagram of a torsional spring member disposed in the flange in the first embodiment of the invention.

FIG. **41** is a schematic diagram illustrating the assembly of the torsional spring member and the driving force receiving opening and the flange, in the first embodiment of the invention.

FIG. **42** is a schematic diagram illustrating the action that the driving force receiving opening can partially rotate, in the first embodiment of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

First Embodiment

FIG. **1** is a stereogram of a process cartridge of a preferred embodiment of the invention, and FIG. **2** is an exploded view of the process cartridge illustrated in FIG. **1**. As illustrated in FIG. **2**, a press rod **13** and a first spring **18** are arranged at one side of a process cartridge housing **10**, where a driving force receiving opening **12** is arranged; the press rod **13** and the first spring **18** are combined into a control mechanism; the press rod **13** is arranged inside a guide groove **19** on the process cartridge housing **10** and slides back and forth along the guide groove **19** in the X direction; and the first spring **18** leans against a space between an urging surface **13***a* of the press rod **13** and a leaning surface **19***a* of the guide groove **19** and provides an elastic restoring force for the press rod **13**. When the process cartridge is positioned on an image forming device, the urging surface **13***a* of the press rod **13** tends to be far away from the leaning surface **19***a* when the press rod **13** is under the action of the first spring **19**; one end of the press rod **13** receives an applied force F from the outside to overcome the elastic force of the first spring **18**, and the press rod **13** moves along the direction illustrated by an X arrowhead; and when the force F is canceled, the press rod **13** performs restoring movement along the direction opposite to the direction illustrated by the X arrowhead under the action of the elastic restoring force of the first spring **18**.

FIGS. **6** and **7** are schematic diagrams illustrating the interaction between the driving force receiving opening and the press rod, wherein FIG. **6** illustrates the state when the driving force receiving opening is retracted and FIG. **7** illustrates the state when the driving force receiving opening is extended. As illustrated in FIGS. **6** and **7**, an urging surface **13***a* and a retracted surface **13***b* are arranged on the press rod **13** and are respectively arranged in a staggered form in the direction parallel to the length direction of the press rod **13**, namely the X direction, and in the direction parallel to the axial direction of the driving force receiving opening, namely the Y direction; height difference is formed between the urging surface **13***a* and the retracted surface **13***b* in the Y direction; the urging surface **13***a* is in the upstream in the direction parallel to the X direction, and the retracted surface **13***b* is in the upstream in the direction parallel to the Y direction; and the urging surface **13***a* and the retracted surface **13***b* are subjected to transient connection through an inclined surface **13***c*. As illustrated in FIG. **6**, when the press rod **13** is not pressed, the retracted surface **13***b* supports a support base **12***a* of the driving force receiving opening **12** in the axial direction of the driving force receiving opening **12**, and the driving force receiving opening **12** is in the retracted state. As illustrated in FIG. **7**, when the press rod **13** is pressed by the force F, the press rod **13** moves in the X direction; in the moving process, the support base **12***a* of the driving force receiving opening **12** is transferred from the state of being supported by the retracted surface **13***b* to the state of being supported by the urging surface **13***a* through the inclined surface **13***c*; and in the transient process, the driving force receiving opening **12** is extended in the Y direction and engaged with a driving mechanism **20** for the image forming device. When the force F is canceled, the press rod **13** is restored to the state illustrated in FIG. **6**.

How to retract the driving force receiving opening **12** to guarantee that the driving force receiving opening **12** is disengaged with the driving mechanism on the image forming device and the process cartridge can be successfully disassembled from the image forming device, after the force F is canceled, is illustrated as follows.

As showed in FIGS. **8**, **9**, **10** and **11**. FIG. **8** is a section view of an A-A cross section of the process cartridge illustrated in FIG. **1** when the press rod **13** is pressed and the driving force receiving opening **12** is in the extended state; FIG. **9** is a section view of the A-A cross section of the process cartridge illustrated in FIG. **1** when the press rod **13** is not pressed and the driving force receiving opening **12** is in the retracted state; FIG. **10** is a stereogram of the driving force receiving opening **12** for the process cartridge; and FIG. **11** is a stereogram of the driving force receiving opening **12** for the process cartridge after a press fastener **120** is assembled on the driving force receiving opening **12**. As illustrated in FIGS. **8** and **9**, a photosensitive member **11** is rotationally supported on a main housing of the process cartridge, wherein a flange **11***a* at one end of the photosensitive member **11** is supported by a shaft pin **14** and a flange **11***a* at the other end of the photosensitive member **11** is supported by a support **17**. Under the supporting action of the shaft pin **14** and the support **17**, the photosensitive member **11** can only perform rotational movement around its axial line in the process cartridge, and cannot move along the axial direction of the photosensitive member **11**.

As illustrated in FIGS. **8** and **9**, a second spring **16** is arranged between the driving force receiving opening **12** and the flange **11***a* for the photosensitive member, namely the second spring **16** is arranged between the flange **11***a* and the press fastener **120** of the driving force receiving opening **12**. The second spring **16** provides an elastic restoring force for the driving force receiving opening **12** so that the driving force receiving opening **12** tends to move along the direction opposite to the Y direction. After the process cartridge is assembled into the image forming device, the press rod **13** is pressed by the force F; the driving force receiving opening **12** is supported by the urging surface **13***a* and is in the extended state; and the second spring **16** is compressed between the end faces of the flange **11***a* and the press fastener **120**. When the process cartridge is disassembled from the image forming device, the force F is canceled; the press rod **13** performs restoring movement along the direction opposite to the direction illustrated by the X arrowhead under the action of the first spring **18**, and the urging surface **13***a* and the support base **12***a* are gradually disengaged; the driving force receiving opening **12** performs retracting movement along the direction opposite to the direction illustrated by the Y arrowhead under the action of the elastic force of the second spring **16** until the support base **12***a* contacts the retracted surface **13***b* and is supported by the retracted surface **13***b*; and herein, the driving force receiving opening **12** is in the retracted state and is disengaged with the driving mechanism **20** of the image forming device.

The connection relation between the driving force receiving opening **12** and the photosensitive member **11** and the driving force transmission process are illustrated as follows. As illustrated in FIGS. **10**, **11**, **12** and **13**, a transmission part **12***b*, a first guide post **12***c* and a second guide post **12***d* are arranged on the driving force receiving opening **12**; the

transmission part **12***b* is arranged on the second guide post **12***d*; a stressed groove **11***b*, a first guide groove **11***c*, a second guide groove **11***d*, steel plates **11***e* and a plurality of stressed columns **11***f* are arranged on the flange **11***a* of the photosensitive member **11**; the second guide groove **11***d* is arranged on the sidewalls of the stressed columns **11***f*; the transmission part **12***b* is arranged on the stressed groove **11***b* and can be engaged with the stressed columns **11***f*; and the driving force transmission is performed between the driving force receiving opening **12** and the photosensitive member **11** through the transmission part **11***b* and the stressed columns **11***f*. When the driving force receiving opening **12** rotates, the transmission part **12***b* meets the stress of the stressed columns **11***f*, and the driving force receiving opening **12** transmits the driving force to the photosensitive member **11** through the transmission part **12***b* to drive the photosensitive member **11** to perform rotational movement.

As illustrated in FIGS. **8**, **10** and **12**, the first guide post **12***c* is arranged on the first guide groove **11***c*; the second guide post **12***d* is arranged on the second guide groove **11***d*; and the first guide post **12***c* and the second guide post **12***d* can respectively slide, in the axial direction of the photosensitive member **11** (namely the Y direction), on the first guide groove **11***c* and the second guide groove **11***d*.

The first guide post **12***c*, the second guide post **12***d*, the first guide groove **11***c*, the second guide groove **11***d*, the transmission part **12***b*, the stressed columns **11***f* and the second spring **16** are combined into a retractable mechanism.

FIGS. **4** and **5** illustrate two conditions where dead angles occur when no steel plates **11***e* are arranged on the photosensitive member **11**, when the driving force receiving opening and the driving mechanism **20** on the image forming device are engaged with each other. As illustrated in FIGS. **4** and **5**, when the dead angles occur during the engagement of the driving force receiving opening **12** and the driving mechanism **20**, the driving force receiving opening **12** cannot be normally engaged with the driving mechanism **20** as the driving force receiving opening **12** cannot rotate on the photosensitive member **11** along the illustrated direction. The two conditions can result in the fact that the driving force receiving opening cannot operate normally.

As illustrated in FIG. **3**, when the driving force receiving opening **12** is arranged on the photosensitive member **11**, the transmission part **12***b* is arranged between the steel plates between the stressed columns **11***f*. When the driving force receiving opening **12** is engaged with the driving mechanism **20** on the image forming device, the transmission part **12***b* *is* always arranged between the steel plates **11***b*, so as to guarantee that the dead angles cannot occur when the driving force receiving opening **12** is engaged with the driving mechanism **20**.

The embodiment can also be as follows: one end of the spring **16** contacts the driving force receiving opening **12** while the other end of the spring **16** contacts the process cartridge housing **10**; and the driving force receiving opening is disengaged with the driving mechanism under the action of the elastic force of the spring.

Second Embodiment

In the above embodiment, only the driving force receiving opening **12** can be driven by the press rod **13** to extend or retract in the axial direction of the photosensitive member **11** so as to engage or disengage with the driving mechanism **20** on the image forming device. It can be understood that a retractable mechanism in this embodiment can also adopt the mode that a driving force receiving opening **12** and a photosensitive member **11** are integrated into a whole and extended or retracted together, and the engagement and disengagement of the driving force receiving opening **12** and the driving mechanism **20** on the image forming device is controlled by a press rod **13**. The structures which are the same with those of the first embodiment (such as a control mechanism) are not described in detail here.

The structure and the working process of the retractable mechanism are as follows:

As illustrated in FIG. **9**, a shaft pin **14** and a support **17** are arranged on a process cartridge housing **10**; a flange **11***a* at one end of the photosensitive member **11** is supported by the shaft pin **14** and a flange **11***a* at the other end of the photosensitive member **11** is supported by the support **17**; and the photosensitive member **11** can move along the axial direction of the photosensitive member together with the driving force receiving opening **12**. The retractable mechanism adopted in the embodiment comprises the shaft pin **14**, the support **17** and the flanges **11***a* at both ends of the photosensitive member **11**.

As illustrated in FIGS. **13** and **14**, a top plate **21** and a tension spring **22** are arranged at one end of the photosensitive member; the driving force receiving opening **12** at the other end of the photosensitive member is fixed on the photosensitive member flange **11***a*; the top plate **21** is fixed on the process cartridge housing **10**; and one end of the tension spring **22** is fixed on the top plate **21** while the other end of the tension spring **22** is fixed on the photosensitive member **11**. When the press rod **13** moves along the X direction and the driving force receiving opening **12** moves along the Y direction, the driving force receiving opening **12** is extended in the Y direction together with the photosensitive member **11** and engaged with the driving mechanism **20** on the image forming device, and the tension spring **22** at the other end of the photosensitive member **11** is in the stretched state. When the press rod **13** is restored along the direction opposite to the X direction, the driving force receiving opening **12** moves along the direction opposite to the Y direction together with the photosensitive member **11** under the action of the tension spring **22** and is disengaged with the driving mechanism **20** on the image forming device.

Third Embodiment

The structure and the operating process of a retractable mechanism in the embodiment, which is the same with those of the first and second embodiments, are not repeated here.

In the invention, the retraction of the driving force receiving opening can not only be realized by a mechanical press mode but also can be controlled by an electromechanical mode. The implementation of a control mechanism is as follows:

As illustrated in FIG. **15**, the embodiment adopts a single-coil solenoid valve **4***d* to control the engagement and disengagement of a driving force receiving opening **5***d* at the driven side of a connecter **14***d* and a driving mechanism **6***d* of an image forming device. The driving force receiving opening **5***d* is arranged at one end of a shaft **8***d* of the connector **14***d*, and the other end of the shaft **8***d* of the connector **14***d* passes through a hollow cylinder of the solenoid valve **4***d* and can move left or right relative to the solenoid valve; the solenoid valve **4***d* is fixed on a process cartridge housing **19***d* and does not move when the shaft **8***d* slides; one end of a metallic A core **17***d* and the shaft **8***d* are integrated into a whole, and the other end of the metallic A core **17***d* can slide back and forth in a groove arranged at a

gear end of a photosensitive member **16***d*; the metallic A core can adopt various structural shapes and can be disc-shaped, cross-shaped, spherical, etc, as long as the metallic A core can slide in the groove arranged, at the gear end of the photosensitive member, corresponding to the shape of the A core; the metallic A core **17***d* can transmit a driving force to the photosensitive member **16***d* and rotate together with the photosensitive member **16***d*; a second elastic component **18***d* is arranged between the solenoid valve **4***d* and the A core **17***d* and provides an elastic restoring force for the A core, wherein the elastic restoring force is used for restoring the A core after the solenoid valve is in the power-off state; and the solenoid valve **4***d* is connected with an external power source through a connection **7***d*.

The embodiment adopts the electromechanical mode to control the engagement and disengagement of the driving force receiving opening **5***d* and the driving mechanism **6***d* for the image forming device. FIG. **17** is a schematic diagram of a control circuit. When the coil circuit of the solenoid valve is turned on, the power-on coil will generate a magnetic field and generate a magnetic force to the metallic A core **17***d* due to the electromagnetic induction; the magnetic force overcomes an elastic force of the second elastic component **18***d* and attracts the A core **17***d* to be close to the solenoid valve; and the A core **17***d* moves left together with the shaft **8***d*, so that the driving force receiving opening **5***d* fixed at the driven side of the connector is extended through the shaft **8***d* and engaged with the driving mechanism **6***d* for the image forming device, thus the transmission of a rotary force is realized. When the circuit of the solenoid valve is turned off, the coil is powered off without magnetic field generated and has no magnetic attraction to the metallic A core **17***d* accordingly, as illustrated in FIG. **16**, the metallic A core **17***d* is driven to slide to the direction far away from the solenoid valve under the action of the elastic force of the second elastic component **18***d*; and meanwhile, the driving force receiving opening **5***d* is drawn by the shaft **8***d* of the connector **14***d* to slide to the direction of the solenoid valve, so that the driving force receiving opening **5***d* is disengaged with the driving mechanism **6***d* for the image forming device. Therefore, the engagement and disengagement of the driving force receiving opening **5***d* and the driving mechanism **6***d* for the image forming device is well realized through the on-off control of the circuit of the solenoid valve.

The operating power source of the solenoid valve in the embodiment comes from the image forming device. As both the operating voltage and the operating current of the solenoid valve are low, a transformer for reducing the voltage and increasing the current is required to be added in the circuit. As illustrated in FIG. **17**, Vcc is the power source for the image forming device; R**1** is a protective resistance; R**2** is an impedance of the coil of the solenoid valve; L**1** and L**2** are respectively primary and secondary coils of the transformer; and the on-off state of the circuit is controlled by a switch Si.

The solenoid valve of the embodiment can also be power-on through direct current. As illustrated in FIG. **18**, an inductor L**3** for removing alternating current is required to be added in the circuit.

The switch S**1** in the circuit of the embodiment can be arranged inside a primary coil circuit and can also be arranged inside a secondary coil circuit as long as the on-off control of the control circuit can be achieved.

Fourth Embodiment

The third embodiment utilizes the single-coil solenoid valve to control the extension and retraction of the driving force receiving opening. The invention can also utilize a double-coil solenoid valve to achieve the same effect. The detailed description of another embodiment of the control mechanism is as follows:

As illustrated in FIG. **19**, the embodiment adopts the double-coil solenoid valve **15***d* to control the engagement and disengagement of a driving force receiving opening **5***d* at the driven side of a connector **14***d* and a driving mechanism **6***d* on an image forming device. The structures which are the same with those of the third embodiment are not described in detail here. The differences between the embodiment and the third embodiment are as follows: the solenoid valve of the embodiment is formed by two coils, namely a first coil **9***d* and a second coil **10***d*; a magnet **11***d* is arranged between the two coils and fixed on the solenoid valve and does not contact the two coils; and no elastic component is arranged between the solenoid valve **15***d* and a metallic A core of the embodiment. In the embodiment, the first coil **9***d* and the second coil **10***d* do not operate at the same time; and the condition that only one coil between the coils operates or both coils do not operate can be controlled by a circuit at any moment, but the condition that both coils operate at the same time cannot occur. Moreover, the coils in the embodiment are subjected to instantaneous power, and the POH (Power On Hours) is 3 seconds or less.

As illustrated in FIG. **21**, the on-off state of the first coil **9***d* and the second coil **10***d* is controlled by SPDT (single-pole double-throw) switch in the circuit. When the first coil **9***d* is turned on, due to the electromagnetic induction, the power-on coil will generate a magnetic field and generate a magnetic force to a metallic A core **17***d*, so as to attract the A core **17***d* to be close to the solenoid valve, thus the driving force receiving opening **5***d* fixed at the driven side of a connector is extended through a shaft **8***d* and engaged with a driving mechanism **6***d* for an image forming device. As the coils of the embodiment are subjected to instantaneous power, the attractive force of the first coil **9***d* to the metallic A core **2** will disappear after the coils are turned on. In order to guarantee that the driving force receiving opening **5***d* can continue to be closely engaged with the driving mechanism **6***d* for the image forming device, the shaft **8***d* of the connector is attracted by a magnet **11***d* on the solenoid valve to be fixed at a position, at which the driving force receiving opening **5***d* is maintained to be engaged with the driving mechanism **6***d* for the image forming device. When the second coil **10***d* is turned on, due to the electromagnetic induction, the power-on coil will generate a magnetic field, but the directions of the magnetic fields generated by the two coils are opposite to each other as the first coil **9***d* and the second coil **10***d* share a positive electrode of the power source. Therefore, the magnetic force of the magnetic field generated by the second coil **10***d* to the metallic A core **17***d* will drive the connector to perform restoring movement. That is to say, as illustrated in FIG. **20**, the metallic A core **17***d* slides to the direction far away from the solenoid valve but a driving head slides to the direction close to the solenoid valve; and the magnet **11***d* attracts the shaft **8***d* again to keep the shaft **8***d* to be at a position, at which the driving force receiving opening **5***d* is disengaged with the driving mechanism **6***d* for the image forming device. Therefore, the engagement and disengagement of the driving force receiving opening **5***d* and the driving mechanism **6***d* for the image forming device is well realized through the on-off control of the circuit of the solenoid valve.

The operating power source of the solenoid valve in the embodiment comes from dry cells added on the process cartridge. As illustrated in FIG. **21**, E is a dry cell battery

pack; a SPDT (single-pole double-throw) S2 controls the first coil 9*d* and the second coil 10*d* to be powered on respectively; and R3 and R4 are respectively impedances of the first coil 9*d* and the second coil 10*d*.

The embodiment can also be as follows: when the second coil 10*d* is turned on, the A core 17*d* is attracted to be close to the direction of the solenoid valve; and when the first coil 9*d* is turned on, a repulsive force is generated to drive the metallic A core 17*d* to slide to the direction far away from the solenoid valve. That is to say, users only need to guarantee that only one coil between the first coil 9*d* and the second coil 10*d* operates or both coils do not operate at any moment.

Fifth Embodiment

The structures of the embodiment are basically the same with those of the first embodiment, so the structures which are the same with those of the first embodiment (such as a retractable mechanism) are not described in detail here.

A control mechanism adopted by the embodiment is as follows:

FIG. 22 is a section view of a process cartridge of the embodiment. In the embodiment, a guy 15 passing through a shaft pin 14 on a process cartridge housing 10, is connected with a driving force receiving opening 12, and can slide in a photosensitive member 11 along the axial direction of the photosensitive member 11; the driving force receiving opening 12 is arranged on a flange 11*a* for the photosensitive member 11 (the connection means and the driving force transmission mode are the same with those of the first embodiment); a press fastener 120*a* is arranged on the driving force receiving opening 12; one end of a second spring 16*a* contacts the flange 11*a* while the other end of the second spring 16*a* contacts the press fastener 120*a*; and the second spring 16*a* is a pressure spring.

As illustrated in FIG. 22, when the process cartridge is arranged on an image forming device, a tensile force F1 is applied to the guy 15 in the direction perpendicular to the axial direction of the photosensitive member. Due to the characteristic of the guy, the tensile force F1 born by the guy 15 is transferred into a tensile force F2 along the axial direction. Herein, the tensile force F2 makes the driving force receiving opening 12 to move left, and the second spring 16*a* is in the compressed state. When the tensile force F1 is cancelled, the second spring 16*a* is restored and makes the driving force receiving opening 12 to move right, and herein the driving force receiving opening 12 is engaged with a driving mechanism on the image forming device. When the process cartridge is disengaged with the image forming device, the guy 15 bears the tensile force F1 again, and the driving force receiving opening 12 is made to move left and be disengaged with the driving mechanism.

The tensile force F1 in the embodiment can be transmitted from the outside, such as a handle of the process cartridge. One end of the guy 15 is connected with the handle while the other end of the guy 15 is connected with the driving force receiving opening 12. When the handle of the process cartridge is stretched, the guy 15 is stretched together with the handle and receives the tensile force F1 from the handle herein, and the driving force receiving opening is made to move left. When the handle of the process cartridge is not stretched, the guy 15 does not bear the tensile force F1 anymore and the second spring 16*a* makes the driving force receiving opening 12 to move right.

The guy 15 of the embodiment can also be arranged on the process cartridge housing 10 which supports the photosensitive member 11.

In the invention, other elastic materials (such as elastic rubber and elastic steel plate) can be used to replace the spring, and the same technical effect can be achieved as well. The elastic materials and the spring are known as elastic components. Therefore, the first and second springs in the first embodiment are also known as the first and second elastic components, and the second spring in the third, fourth and fifth embodiment can also be known as the second elastic component.

A developer is accommodated in the process cartridge in the above embodiments, and the process cartridge is also provided with developing components for realizing the development of the photosensitive member, a cleaning component, a charging component and so on. No detailed description is given here.

Sixth Embodiment

The structures in the embodiment which are the same with those of the first embodiment are not described in detail here.

As illustrated in FIGS. 24 to 27, a driving force transmission mechanism for the photosensitive member comprises a driving mechanism A2 (equivalent to a printer driving head described in the Chinese patent application CN2010101313861), a driving force receiving opening A1, a second spring A3, a press fastener A4, a guide sleeve A5, a centering ring A6, a photosensitive member flange A7, a press rod A9, a first spring A10 and a flange A11 (equivalent to an end cover described in the Chinese patent application CN2010101313861), wherein the driving force receiving opening A1, the guide sleeve A5, the centering ring A6 and the photosensitive member flange A7 are connected with each other in turn; the driving force receiving opening A1 is engaged with the driving mechanism A2 and receives a rotational driving force from the driving mechanism A2; a driving force transmission part A1*a* which is also arranged on the driving force receiving opening A1, is engaged with the photosensitive member flange A7, transmitting the rotational driving force from the driving mechanism A2 to the photosensitive member flange A7, and providing the rotational driving force for the photosensitive member flange A7; a circular boss A1*b* is also arranged on the driving force receiving opening A1; a driving force receiving opening support base A5*b* is arranged on the guide sleeve A5; the circular boss A1*b* is arranged on the driving force receiving opening support base A5*b* and can rotate freely relative to the driving force receiving opening support base A5*b*, so that the driving force receiving opening A1 can rotate freely relative to the guide sleeve A5; a boss A5*c* and an axial limiting interface A5*e* are arranged on the guide sleeve A5; a guide sleeve support base A6*c* is arranged on the centering ring A6; the boss A5*c* is arranged on the guide sleeve support base A6*c*; the guide sleeve support base A6*c* has height difference in the axial direction of the photosensitive member as illustrated in FIG. 27; clamping blocks A11*e* are arranged on the flange A11 and arranged inside the axial limiting interface A5*e* and used for limiting the rotational movement of the guide sleeve A5; when the guide sleeve support base A6*c* moves relative to the boss A5*c*, the guide sleeve A5 is driven to move along the axial direction of the photosensitive member and then the driving force receiving opening A1 is driven to move along the axial direction of the photosensitive member; a boss A6*b* is arranged on the

centering ring A6; a limiting groove A7*c* for the second spring A3 and a limiting groove A7*b* for the centering ring A6 are arranged on the photosensitive member flange A7; the boss A6*b* is arranged inside the limiting groove A7*b* for the centering ring A6 and driven to rotate freely on the limiting groove A7*b* for the centering ring A6, and then the photosensitive member A8 can rotate freely relative to the centering ring A6; the driving mechanism A2 and the driving force receiving opening A1 are engaged with each other for the driving force transmission; the press fastener A4 is arranged at one end of the driving force receiving opening A1; the second spring A3 is arranged between the press fastener A4 and the limiting groove A7*c* for the second spring A3; one end of the first spring A10 is arranged on the press rod A9 while the other end of the first spring A10 is arranged on a toner cartridge A12; the press rod A9 is connected with the centering ring A6; the photosensitive member A8 is connected with the photosensitive member flange A7; and the guide sleeve A5 and the driving force receiving opening A1 are connected with the centering ring A6 by axial sliding.

A retractable mechanism comprises the driving force transmission part A1*a*, the press fastener A4 and the second spring A3, and a control mechanism comprises the circular boss A1*b*, the guide sleeve A5, the centering ring A6, the press rod A9, the first spring A10 and the flange A11.

The driving force transmission process of the whole driving force transmission mechanism in the embodiment is described in detail as follows. As illustrated from FIGS. **24** to **29**, the driving force receiving opening A1 and the driving mechanism A2 are in the disengaged state during the installation of the toner cartridge A12 and are still kept for certain distance when the toner cartridge A12 is installed in place. After the toner cartridge A12 is installed and when a machine cover is closed, the press rod A9 is pushed by the machine cover of the image forming device (equivalent to a printer described in the Chinese patent application CN2010101313861) to make the centering ring A6 connected with the press rod A9 rotate clockwise along the radial direction of the photosensitive member. As the rotational movement of the guide sleeve is avoided due to the connection of the clamping blocks A11*e* on the flange A11 and the axial limiting interface A5*e* of the guide sleeve, the guide sleeve A5 can be driven, by the centering ring A6 through axial thrust generated by a centering ring bevel A6*a* and a guide sleeve bevel A5*a*, to extend along the axial direction of the photosensitive member, thus the driving force receiving opening A1 arranged on the guide sleeve A5 is driven to be extended and engaged with the driving mechanism A2, consequently the driving mechanism A2 makes the driving force receiving opening A1 to drive the photosensitive drum A8 to rotate along the axial direction of the photosensitive drum A8. Herein, both the second spring A3 and the first spring A10 are in the compressed state, and the axial extended travel of the driving force receiving opening A1 in the state is between 3.8 and 4.8 mm compared with that in the state before the machine cover for the image forming device is closed. After the printing process is completed and when the machine cover for the image forming device is opened, the pressure applied to the press rod A9 by the machine cover for the image forming device is canceled, and the press rod A9 with the restoring function is retracted under the action of an acting force of the first spring A10, so as to make the centering ring A6 to rotate counterclockwise along the radial direction of the centering ring A6; the axial thrust between the centering ring bevel A6*a* and the guide sleeve bevel A5*a* is canceled, and the compressed second spring A3 is restored, so as to make the driving force receiving opening A1 to be retracted and disengaged with the driving mechanism A2; and the printing process is completed.

As illustrated in FIGS. **30** and **31**, in the embodiment, a bevel positioning groove A7*a* is arranged inside the photosensitive member flange A7. The driving force transmission part A1*a* of the driving force receiving opening A1 is arranged in the middle of the bevel positioning groove A7*a* before the driving force receiving opening A1 is extended in the axial direction of the photosensitive member and engaged with the driving mechanism A2, so that the driving force receiving opening A1 can be driven to be extended in the axial direction of the photosensitive member and engages with the driving mechanism A2 while aligning with the driving mechanism A2 (the alignment means that the driving force receiving opening A1 rotates a little around the axial direction of the driving force receiving opening A1), thus the phenomenon of meeting dead angles during the engagement of the driving force receiving opening A1 and the driving mechanism A2 is avoided.

In this invention, the process cartridge is the same as the toner cartridge.

In the first embodiment, as illustrated in FIGS. **3**, **10**, **11**, **12** and **32**, the steel plate **11***e* in the flange **11***a* of the photosensitive member **11** is disposed between two stressed columns **11***f*. The steel plate **11***e* is two U-shaped or V-shaped elastic pieces. Similarly, the transmission part **12***b* of the driving force receiving opening **12** mounted in the flange **11***a* is disposed in the steel plate **11***e* (as shown in B-B partial section view of the flange **11***a* in FIG. **32**). Due to the urge action of the inclined surface **13***c* to the support base **12***a* of the driving force receiving opening **12**, when the driving force receiving opening **12** is extended along the Y direction and engaged with the driving mechanism **20** of the image forming device, as the driving force receiving opening **12** is engaged with the driving mechanism **20** and receives the rotary driving force from the driving mechanism **20**, the driving force is transmitted to the driving force receiving opening **12** through the mutual engagement between projections **12***a***1** on the front of the driving force receiving opening **12** and the transmission columns **20***a* of the driving mechanism **20** and the abutting of side faces of the transmission columns **20***a* against side faces of the projections **12***a***1**. Thus, when the driving force receiving opening **12** is extended along the Y direction and subjected to contact and engage with the driving mechanism **20**, the top of the projections **12***a***1** thereof and the bottom of the transmission columns **20***a* have large possibility to abut against each other to form structural interference. Due to the structural interference between the projections **12***a***1** and the transmission pins **20***a*, the driving force receiving opening **12** cannot be continuously extended along the Y direction to be engaged with the driving mechanism **20**. As illustrated in FIGS. **32** to **34**, the steel plate **11***e* is disposed between two stressed columns **11***f* in the flange **11***a*, and the transmission part **12***b* of the driving force receiving opening **12** is also disposed between the two stressed columns **11***f*. A space H1 is formed between two stressed columns **11***f* (the space H1 is greater than or equal to the maximum width H2 of the steel plate **11***e* and greater than the width of the transmission part **12***b*). Thus, the driving force receiving opening **12** mounted in the flange **11***a* can partially rotate towards the counterclockwise direction R or the clockwise direction L relative to the rotation axis thereof. Simultaneously, the steel plate **11***e* disposed in the flange **11***a* make the transmission part **12***b* of the driving force receiving opening **12** being always

kept between the two stressed columns **11***f* and does not abut against the stressed columns **11***f*.

As illustrated in FIGS. **35** and **36**, the structural interference produced in the process of contacting and engaging between the projections **12***a***1** on the front of the driving force receiving opening **12** and the transmission columns **20***a* of the driving mechanism **20** has two cases: (1) when the top of the projections **12***a***1** and the bottom of the transmission columns **20***a* abut against each other to form structural interference, as partial movement can be achieved when the transmission part **12***b* of the driving force receiving opening **12** is disposed in the steel plate **11***e* and disposed between the two stressed columns **11***f*, the driving force receiving opening **12** is affected by the mutual abutting and sliding between the projections **12***a***1** and the transmission columns **20***a* and rotates towards the clockwise direction L relative to the rotation axis thereof; in this case, continuous structural interference between the top of the projections **12***a***1** and the bottom of the transmission columns **20***a* can be avoided; and simultaneously, the transmission part **12***b* can abut against one side of the steel plate **11***e* so that the steel plate **11***e* is elastically deformed; and (2) as similar to the case (1), when the driving force receiving opening **12** is affected by the mutual abutting and sliding between the projections **12***a***1** and the transmission columns **20***a* and can rotate towards the counterclockwise direction R relative to the rotation axis thereof, continuous structural interference between the top of the projections **12***a***1** and the bottom of the transmission columns **20***a* can be also avoided; and simultaneously, the transmission part **12***b* can abut against the other side of the steel plate **11***e* so that the steel plate **11***e* is elastically deformed. Finally, when there is no structural interference between the projections **12***a***1** and the transmission columns **20***a*, the driving force receiving opening **12** is continuously extended along the Y direction and engaged with the driving mechanism **20** of the image forming device. Along with the rotation of the driving mechanism **20**, the side faces of the transmission columns **20***a* can abut against the side faces of the projections **12***a***1**, and the rotary driving force can be transmitted to the driving force receiving opening **12**. Along with the rotation of the driving force receiving opening **12**, the transmission part **12***b* thereof leans against one side of the steel plate **11***e*, so that the steel plate **11***e* is elastically deformed and abuts against the stressed column **11***f*, and hence the rotary driving force is transmitted to the flange **11***a*, as illustrated in FIG. **37**. When the driving force receiving opening **12** is disengaged from the driving mechanism **20**, as the transmission part **12***b* is not stressed to abut against the steel plate **11***e*, the elastic force of the steel plate **11***e* is restored, so that the transmission part **12***b* is pushed to the position between the two stressed columns **11***f* and has a clearance with the stressed column **11** and does not make contact with the stressed columns **11**. Thus, when the driving force receiving opening **12** makes contact engagement with the driving mechanism **20** again, the driving force receiving opening **12** can partially rotate towards the counterclockwise direction R or the clockwise direction L relative to the rotation axis thereof again, and the structural interference between the projections **12***a***1** and the transmission columns **20***a* can be avoided again.

In addition, as illustrated in FIG. **38**, the steel plate **11***e* in the flange **11***a* may also be replaced by two magnetic members **11***g*; the transmission part **12***b* in the driving force receiving opening **12** is a magnetic cylinder; the two magnetic members **11***g* are respectively arranged on both sides of the transmission part **12***b* and disposed on the two stressed columns **11***f*; when the driving force receiving opening **12** is mounted on the flange **11***a*, the transmission part **12***b* of the driving force receiving opening **12** and corresponding magnetic member **11***g* are arranged on the same pole so as to achieve the effect that like poles repel each other; and both the poles of the transmission part **12***b* and the corresponding magnetic member **11***g* are set to be S poles or N poles. As the two magnetic members **11***g* are disposed between the two stressed columns **11***f*, the transmission part **12***b* with magnetic property is always disposed between the two magnetic members **11***g* due to the action that like poles repel each other, and hence the adjustment function the same with that of the foregoing steel plate **11***e* can be achieved: the transmission part **12***b* is kept between the two stressed columns **11***f*, has a clearance, and does not make contact with the stressed columns **11***f*, and the driving force receiving opening **12** in the flange **11***a* can partially rotate towards the counterclockwise direction R or the clockwise direction L relative to the rotation axis thereof.

Moreover, as illustrated in FIG. **39**, the steel plate **11***e* in the flange **11***a* may also be replaced by an elastic member **11***h* (e.g., an elastic sponge and an elastic rubber). The elastic member **11***h* may be set to be a pair which are respectively disposed on the two stressed columns **11***f* relative to both sides of the transmission part **12***b*, or the elastic member **11***h* has a U-shaped or V-shaped structure, is disposed between the two stressed columns **11***f*, and is configured to clamp the transmission part **12***b* of the driving force receiving opening **12**, and hence the adjustment function the same with that of the forgoing steel plate **11***e* can be achieved: the transmission part **12***b* is kept between the two stressed columns **11***f* and does not make contact with the stressed columns **11***f*, and the driving force receiving opening **12** in the flange **11***a* can partially rotate towards the counterclockwise direction R or the clockwise direction L relative to the rotation axis thereof.

Furthermore, as illustrated in FIG. **40**, the steel plate **11***e* in the flange **11***a* may also be replaced by a torsional spring member **11***k*. The torsional spring member **11***k* comprises an elastic part **11***k***1**, a first fixing part **11***k***2** and a second fixing part **11***k***3**. The first fixing part **11***k***2** is arranged on the top of the elastic part **11***k***1**, and the second fixing part **11***k***3** is arranged at the bottom of the elastic part **11***k***1**. As illustrated in FIG. **41**, the first guide post **12***c* of the driving force receiving opening **12** runs through the elastic part **11***k***1** of the torsional spring member **11***k* and is hence mounted in the first guide groove **11***c*; the first fixing part **11***k***2** of the torsional spring member **11***k* is arranged on the transmission part **12***b* of the driving force receiving opening **12**; and the second fixing part **11***k***3** of the torsional spring member **11***k* is arranged on the projection **11***a***1** on the inner bottom surface of the flange **11***a*. Due to the assembly of the torsional spring member **11***k* and the driving force receiving opening **12** and the flange **11***a*, as the transmission part **12***b* is disposed between the stressed columns **11***f* and has a clearance, the driving force receiving opening **12** can partially rotate towards the counterclockwise direction R or the clockwise direction L relative to the rotation axis thereof. After the driving force receiving opening **12** is stressed and start to rotate, as the transmission part **12***b* is arranged on the first fixing part **11***k***2** of the torsional spring member **11***k*, the upper half of the torsional spring member **11***k* is torsional along with the rotation of the driving force receiving opening **12**, and the lower half of the torsional spring member **11***k* is fixed as the second fixing part **11***k***3** is arranged on the projection **11***a***1**. Thus, when the driving force receiving opening **12** is not stressed, the upper half of the torsional spring member **11***k* in the torsional state releases the elastic

torsion to pull the transmission part **12***b*, so that the driving force receiving opening **12** rotates and is restored to the initial state (the position state of the driving force receiving opening **12** before being stressed and rotating), and hence the adjustment function the same with that of the foregoing steel plate **11***e* can be achieved: the transmission part **12***b* is always kept between the two stressed columns **11***f* and does not make contact with the stressed columns **11***f*, and the driving force receiving opening **12** in the flange **11***a* can partially rotate towards the counterclockwise direction R or the clockwise direction L relative to the rotation axis thereof, as illustrated in FIG. **42**.

The steel plate **11***e*, the magnetic member **11***g*, the elastic member **11***h* and the torsional spring member **11***k* mounted in the flange **11***a* are all adjusting components for adjusting the position of the transmission part **12***b* of the driving force receiving opening **12** in the flange **11***a*. Before the driving force receiving opening **12** is stressed and rotates, due to the adjusting components thereof, the transmission part **12***b* is always kept between the two stressed columns **11***f* of the flange **11***a* and does not make contact with the stressed columns **11***f*.

What is claimed is:

1. A process cartridge, the process cartridge comprising:
- a process cartridge housing;
- a driving force receiver; and
- a flange including a stressed column;
- a transmission part arranged on said driving force receiver, said transmission part being configured to engage said stressed column to transmit a driving force;
- a steel member arranged inside said flange, wherein said steel member includes an upper contacting portion and a lower positioned portion, said upper contacting portion of said steel member contacts said transmission part, and said lower positioned portion is positioned at an inner bottom surface of said flange;
- a first guide post arranged on said driving force receiver; and
- a first guide groove arranged on said flange, wherein said first guide post is configured to slide, in an axial direction of said flange, on said first guide groove,
- wherein said driving force receiver includes an engaged portion for receiving the driving force, wherein said driving force receiver is configured to extend or retract along said flange, and wherein said engaged portion keeps out of said flange when said driving force receiver extends or retracts along said flange.

2. The process cartridge according to claim **1**, further comprising a second guide groove arranged on said flange, wherein said second guide groove is arranged on a sidewall of said stressed column.

3. The process cartridge according to claim **1**, further comprising a spring arranged between said driving force receiver and said flange, said spring providing an elastic restoring force for said driving force receiver.

4. The process cartridge according to claim **1**, wherein said steel member is elastic.

5. The process cartridge according to claim **1**, further comprising a photosensitive member, wherein said flange is arranged at one end of said photosensitive member.

6. A process cartridge, the process cartridge comprising:
- a process cartridge housing;
- a driving force receiver;
- a flange including at least two stressed columns;
- a transmission part arranged on said driving force receiver, said transmission part being configured to engage said stressed columns to transmit a driving force;
- an adjustable component arranged on said flange, wherein said adjustable component is configured to arrange said transmission part between said stressed columns when not to transmit the driving force to said stressed columns;
- a first guide post arranged on said driving force receiver; and
- a first guide groove arranged on said flange, wherein said first guide post is configured to slide, in an axial direction of said flange, on said first guide groove.

7. The process cartridge according to claim **6**, further comprising a spring arranged between said driving force receiver and said flange, said spring providing an elastic restoring force for said driving force receiver.

8. The process cartridge according to claim **6**, wherein said adjustable component includes any one of the following: a steel member, a magnetic member, an elastic member and a torsional spring member.

9. The process cartridge according to claim **8**, wherein said steel member is two U-shaped or V-shaped elastic pieces.

10. The process cartridge according to claim **8**, wherein said transmission part is magnetic cylinder; said magnetic members are arranged on the both sides of said transmission part.

11. The process cartridge according to claim **8**, wherein said elastic member is an elastic sponge or an elastic rubber.

12. The process cartridge according to claim **8**, wherein said torsional spring member comprises an elastic part, a first fixing part and a second fixing part; said first fixing part is arranged on the top of said elastic part, said second fixing part is arranged at the bottom of said elastic part.

13. The process cartridge according to claim **12**, further comprising a projection arranged on an inner bottom surface of said flange, wherein said first fixing part of said torsional spring member is arranged on said transmission part of said driving force receiver, and wherein said second fixing part of said torsional spring member is arranged on said projection.

14. A photosensitive member in a process cartridge, the photosensitive member comprising:
- a flange including at least two stressed columns;
- a driving force receiver including an engaged portion for receiving a driving force, said driving force receiver being configured to extend or retract along said flange;
- a transmission part arranged on said driving force receiver, said transmission part being configured to engage said stressed columns to transmit the driving force; and
- an adjustable component arranged on said flange, wherein said adjustable component is configured to arrange said transmission part between said stressed columns when not to transmit the driving force to said stressed columns;
- wherein said engaged portion keeps out of said flange when said driving force receiver extends or retracts along said flange.

15. The photosensitive member according to claim **14**, further comprising:
- a first guide post being arranged on said driving force receiver; and
- a first guide groove being arranged on said flange, wherein said first guide post is configured to slide, in an axial direction of said flange, on said first guide groove.

16. The photosensitive member according to claim 14, further comprising a spring arranged between said driving force receiver and said flange, said spring providing an elastic restoring force for said driving force receiver.

17. The photosensitive member according to claim 14, wherein said adjustable component includes any one of the following: a steel member, a magnetic member, an elastic member and a torsional spring member.

18. The process cartridge according to claim 1, wherein said flange comprises a rotational axis, and wherein said upper contacting portion and said lower positioned portion are arranged around the rotational axis of said flange.

19. The process cartridge according to claim 18, wherein a projection is protruded on said inner bottom surface of said flange, said projection connects with said lower positioned portion of said steel member.

20. The process cartridge according to claim 19, wherein said projection is protruded around the rotational axis of said flange.

21. The process cartridge according to claim 20, wherein said flange at least includes two stressed columns, and wherein said projection is protruded between stressed columns and not in the center of said inner bottom surface of said flange.

22. A process cartridge, the process cartridge comprising:

a process cartridge housing;

a flange including a stressed column;

a driving force receiver including an engaged portion for receiving a driving force, said driving force receiver being configured to extend or retract along said flange, wherein said engaged portion keeps out of said flange when said driving force receiver extends or retracts along said flange;

a transmission part arranged on said driving force receiver, said transmission part being configured to engage said stressed column to transmit the driving force; and

a steel member arranged inside said flange, said steel member including an upper contacting portion and a lower positioned portion,

wherein said upper contacting portion of said steel member contacts said transmission part, and said lower positioned portion is positioned at an inner bottom of said flange.

23. The process cartridge according to claim 1, wherein the flange includes at least two stressed columns, and wherein said steel member is configured to arrange said transmission part between said stressed columns when not to transmit the driving force to said stressed columns.

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